

### Light flight

'Weightless wonder' KC-135 aircraft helps scientists plan return to Moon. Story on Page 3.



### Tense times

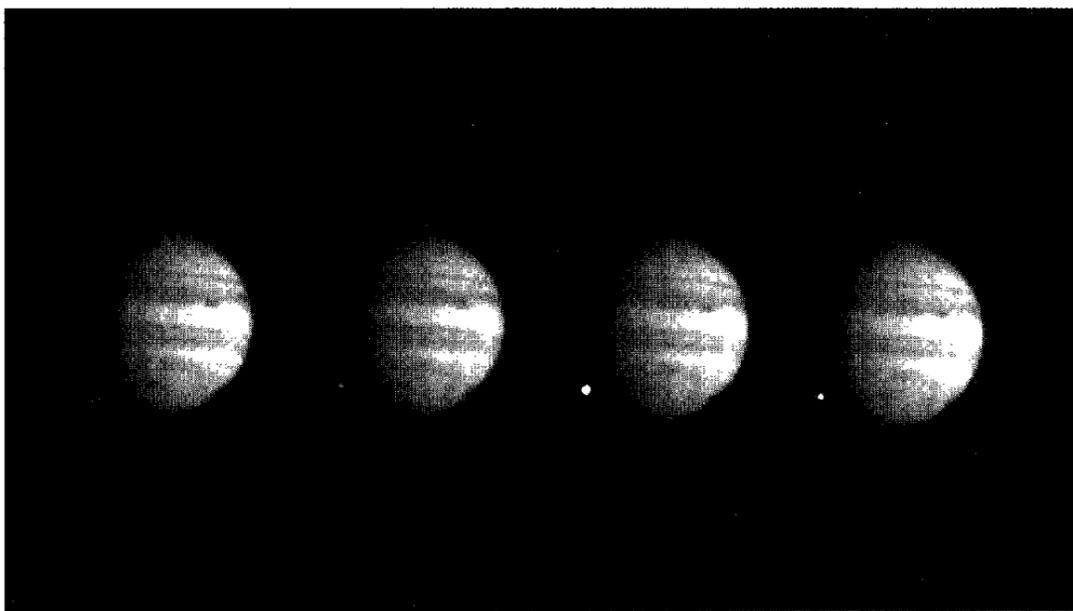
Kennedy Space Center workers supporting STS-65 get caught in a coup d'etat. Story on Page 4.

# Space News Roundup

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No. 33



NASA Photo

**GALILEO SNAPSHOT**—The Galileo space probe's first images of the July impact of Comet Shoemaker-Levy 9 show a bright spot on the gas giant's southern hemisphere. These images of the Fragment W impact were recorded about two and on-third seconds apart on July 22 when the spacecraft was 148 million miles from Jupiter. Dark spots to the right are from previous impacts. Many more images and data from other instruments remain to be returned from Galileo's tape recorder; playbacks will continue through January.

## Fifth pad abort stalls *Endeavour* Discovery laser radar flight moves to front of launch line

By James Hartsfield

Pending an analysis of the cause of *Endeavour's* main engine shutdown on the launch pad last week, preparations are under way to launch *Discovery* on STS-64, another environmental mission, perhaps as early as Sept. 9.

*Endeavour's* engine cutoff came about 2 seconds prior to launch and was apparently the result of high temperature readings in oxygen flowing from the engine No. 3 high pressure oxidizer turbopump. Although higher than anticipated and above the limit for an engine cutoff on the ground, the temperatures recorded were still several hundred degrees below the maximum operating temperature in that area for the main engines.

A preliminary look at the data recorded during the abort and an external inspection of the main engine found no problems during the weekend. The analysis will continue after *Endeavour's* three engines are removed and the turbopump can be inspected and test-

ed. The analysis will be completed prior to *Discovery's* liftoff to ensure no similar problem could occur with STS-64.

*Endeavour* was rolled back to KSC's Vehicle Assembly Bldg. early Wednesday, where the three engines will be removed. The three engines originally slated for *Atlantis* on STS-66 will then be installed in *Endeavour*. If all goes well with the analysis and resolution of the abort, the second Space Radar Laboratory will be ready for a second launch attempt in the first week of October. STS-66 remains set for a late October launch as well.

In the meantime, *Discovery* was moved to Launch Pad 39B late last week, and the STS-64 crew — Commander Dick Richards, Pilot Blaine Hammond and Mission Specialists Jerry Linenger, Susan Helms, Carl Meade and Mark Lee — traveled to KSC Tuesday for a dress rehearsal countdown. The Terminal Countdown Demonstration Test was completed Wednesday. Shuttle managers will meet

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## Latest debris count lowers station hazard

Recent measurements of orbital debris made using a powerful radar system show the level of debris in low-Earth orbit is much lower than anticipated, providing good news for the planned international space station.

NASA just completed the third year of a campaign measuring and monitoring the orbital debris environment using a powerful radar system called the Haystack Orbital Debris Radar.

This powerful radar can detect debris objects as small as 1/4 inch in diameter orbiting 400 miles out.

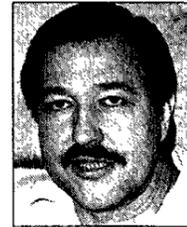
The orbital debris population measured by Haystack has been compared with predictions of the orbital debris environment based on the NASA "engineering model" developed using measurements and data collected prior to 1988.

The measured orbital debris population differed from NASA's predictions over all altitudes that were studied using the Haystack Radar. At low altitudes between 250 - 400 miles the measured debris population was below predicted levels.

"The Haystack radar gives us a unique way of monitoring the space environment," said Don Kessler, JSC senior scientist for orbital debris research. "It's very different from the method used by the U.S. Space Command. With one radar we have been able to statistically monitor the entire orbital debris environment."

According to Kessler, the radar "stares" in one direction to measure objects passing through the beam. Scientists then can measure the range rate and rough direction of motion of the objects passing through the beam.

"What you're really measuring is the rate at which things go through an area of space," Kessler said. "And that's exactly what we need to know when we're evaluating hazards." Although the Haystack radar has been in use for some time, the concept of using it in this unique "staring" mode was developed by JSC scientists Drew Potter and Gene Stansbery.



Kessler

"When we proposed this idea," Kessler said, "people were skeptical of its success, but it has provided us with a way to statistically measure the orbital debris environment quickly and accurately."

According to George Levin, manager of the Orbital Debris Program at NASA Headquarters, engineers and scientists

believe there are three major reasons why earlier predictions overestimated the space station debris population.

"The first reason for this improvement in the orbital debris environment is the success of NASA's Orbital Debris Mitigation Program," Levin said. Since 1987 when a third stage belonging to the European Space Agency exploded in orbit, the agency has made a concerted effort to inform other spacefaring nations of the hazards these types of explosions present to orbiting spacecraft.

"As a result of these efforts, ESA, Japan, China and Russia all have joined NASA in modifying the designs of their launch vehicles and their satellites to minimize the possibility of future accidental explosions in space," Levin said.

The economic and political upheaval of the past decade also has

Please see **ECONOMIC**, Page 4

## Workshops tackle challenge of negativity in face of change

Keeping a positive, constructive outlook in the face of sweeping change will be the focus of an upcoming series of "Workshops on Change and Negativity in the Workplace."

"As change occurs, we must be ready to support new ways of doing business," said JSC Director Dr. Carolyn Huntoon. "Learning to adapt and change positively will strengthen

the JSC team and turn the future opportunities of our center into reality."

The free workshops, which are expected to enhance the innovative foundation and structure of JSC, will be held Tuesday and Wednesday in the Gilruth Center ballroom. All JSC civil service employees and contractors are invited to attend as their workloads permit. No advance registration is required.

"Implementing change needs to be done with speed and skill," Federal Women's Program Manager Pam Adams said. "These courses are designed with handouts providing solid and practical information that can be taken back and utilized immediately in the workplace."

Dr. Nate Booth, head corporate trainer for Robbins research International of San Diego, will present

Tuesday's workshops. He is the author of three books and presenter of more than 800 seminars focusing on solid, practical information for utilizing change.

The first day's schedule begins at 8:15 a.m. with a course on "Change, Challenge and Choice." The course is designed to help professionals working in changing environments learn to react and utilize change. It

will help employees with specific techniques for taking an active approach.

At 1 p.m., Tuesday's schedule continues with "Managing in the Midst of Rapid Change," a course designed to provide a new set of skills for managing in an environment of change. The course is tailored for current and potential managers who want to bring

Please see **WORKSHOPS**, Page 4

### JSC workers relax by flying hot-air balloons

## Silent flight only way to travel

By Kelly Humphries

When the weekend comes, two JSC workers turn their attentions from the future of the space program to the present-day art of silent flight.

And this weekend, Dave Koenig and Ginger Barnes will be among a bevy of balloonists participating in the second annual "Ballunar Liftoff" from Rocket Park.

In everyday life, Koenig is a microbiologist for Krug Life Sciences who works on ways to control bacterial contamination of spacecraft drinking water lines and closed-loop water recycling for future spacecraft. Barnes is an international contracts manager for Boeing, who helps handle the business end of the International Space Station.

But what sets them free from the high-tech

worlds of science and business is hot-air ballooning, a sport both have been pursuing for about 15 years.

"It's my release—it's like golf to a golfer or fishing to a fisher person," Barnes says. "I get grumpy if I haven't flown in a while. You can forget everything. You don't care how bad your day's going or the week's gone. It's like floating on air, it's like magic."

"It's relaxing," agrees Koenig, who tries to fly every weekend. "It's very quiet and you can hover inches over things because you have excellent control. There's no sensation of movement. You're going the speed of the wind, so there's no wind in your face. And the air smells mighty good at 6,000 feet."

Hot-air ballooning, Koenig cautions, is pri-

Please see **JSC**, Page 4



Dave Koenig's balloon, third from left, participated in last year's first annual "Ballunar Liftoff" from Rocket Park. He'll be participating again in this year's liftoff, which will include tests of piloting skill such as bean-bag target drops and "fox and hound" chases.

JSC

# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

**Seaworld of Texas:** Discount tickets: adult \$20.95; child (3-11), \$14.25.

**Fiesta Texas:** Discount tickets: adult \$18.95; child (4-11) and seniors (55+), \$14.25.

**Astroworld:** Discount tickets: adult \$13.75.

**Moody Gardens:** Discount tickets for two of three different attractions: \$9.50

**Space Center Houston:** Discount tickets: adult, \$8.75; child (3-11), \$7.10; commemorative, \$9.55.

**Metro tickets:** Passes, books and single tickets available.

**Movie discounts:** General Cinema, \$4.75; AMC Theater, \$4; Loew's Theater, \$4.75.

**Stamps:** Book of 20, \$5.80

**JSC history:** *Suddenly, Tomorrow Came: A History of the Johnson Space Center*, \$11.

**Apollo Souvenirs:** Apollo 11 25th Anniversary souvenirs are being restocked in the Bldg. 11 Exchange Store.

JSC

# Gilruth Center News

**Sign up policy:** All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

**EAA badges:** Dependents and spouses may apply for photo identification badges from a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

**Weight safety:** Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Sept. 6 and Sept. 12. Pre-registration is required. Cost is \$5.

**Defensive driving:** Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is Sept. 10. Cost is \$19.

**Aerobics:** High/low-impact class meets from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

**Aikido:** Martial arts class meets from 5-7:30 p.m. Tuesdays and 6:15-8:15 p.m. Wednesdays. Black Belt class from 6-8 p.m. Fridays, requires instructor permission. Cost is \$25 per month. New classes begin the first of each month.

**Country Dancing:** Classes meet Mondays. Beginners class meets from 7-9 p.m.; advanced class meets from 8:30-10 p.m. Partners are required. For additional information, contact the Gilruth Center at x33345.

**Golf Lessons:** Lessons for all levels. Cost is \$90 for six weeks. For additional information, contact x33345.

**Sailing Club:** Intermediate sailing classes will be held on Saturdays, Sept. 17, Oct. 1 and Oct. 15. For additional information, contact Richard Hoover at x31360, or 996-7716.

**Fitness program:** Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

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# Dates & Data

## Today

**Cafeteria menu** — Special: baked meatloaf. Total Health: light macaroni and cheese. Entrees: baked scrod with Hollandaise, broiled chicken, pork and beef egg rolls, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: stewed tomatoes, seasoned spinach, cut corn, macaroni and cheese.

## Monday

**Cafeteria menu** — Special: Italian cutlet. Total Health: roast beef au jus. Entrees: chicken a la king, enchiladas with chili, baked lasagna with meat, steamed fish, French dip sandwich. Soup: split pea and ham. Vegetables: Brussels sprouts, oriental vegetables, buttered carrots, lima beans.

## Tuesday

**Cafeteria menu** — Special: stuffed cabbage rolls. Total Health: roasted turkey. Entrees: turkey and dressing, country style steak and hash browns, beef ravioli, baked chicken, French dip sandwich. Soup: tomato Florentine. Vegetables: Italian blend, okra and tomatoes, corn coblette, navy beans.

## Wednesday

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Aug. 31 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

**Cafeteria menu** — Special: pepper steak. Total Health: stir fry pork with rice. Entrees: liver and onions, catfish and hush puppies, stir-fry pork with rice, steamed fish, Reuben sandwich. Vegetables: steamed broccoli, yellow squash, macaroni and cheese, vegetable sticks.

## Thursday

**Cafeteria menu** — Special: chicken fried steak. Total Health: fat-free vegetable soup. Entrees:

beef tacos, scrod with Hollandaise sauce, steamed fish, French dip sandwich. Soup: navy bean. Vegetables: spinach, cut corn, breaded okra, pinto beans.

## Friday

**Cafeteria menu** — Special: tuna noodle casserole. Total Health: steamed salmon steak. Entrees: steamed salmon steak, roast beef, baked chicken, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: French cut green beans, cauliflower with cheese, green peas, black-eyed peas.

## Sept. 5

**Labor Day** — Most JSC offices will be closed in observance of the Labor Day Holiday.

## Sept. 6

**NMA Courses** — The JSC chapter of the National Management Association will offer a professional development course "Challenging People to Succeed" from 5-7 p.m. Tuesdays from Sept. 6 through Nov. 8. For more information, contact Jovan-Justine Love, x39319.

## Sept. 7

**NMA Courses** — The JSC chapter of the National Management Association will offer a professional development course "Leadership Development" from 5-7 p.m. Wednesdays from Sept. 7 through Oct. 19. For additional information, contact Jovan-Justine Love, x39319.

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Sept. 7 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

## Sept. 12

**NMA Courses** — The JSC chapter of the National Management Association will offer a professional development course "Business Concepts" from 5-7 p.m. Mondays from Sept. 12 through Oct. 24. For

more information, contact Jovan-Justine Love, x39319.

## Sept. 14

**PSI meets** — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Sept. 14 at the Holiday Inn on NASA Road 1. For additional information, contact Elaine Kemp, x30556 or Diana Peterson, x33077.

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Sept. 14 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

## Sept. 21

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Sept. 21 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

## Sept. 28

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Sept. 28 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

## Oct. 5

**Toastmasters meet** — The Spaceland Toastmasters meets at 7 a.m. Oct. 5 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

## Oct. 10

**Columbus Day** — Most JSC offices will be closed in observance of the Columbus Day Holiday.

## Oct. 12

**PSI meets** — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Oct. 12 at the Holiday Inn on NASA Road 1. For additional information, contact Elaine Kemp, x30556 or Diana Peterson, x33077.

# Swap Shop

## Property

Rent: University Trace condo, 2-2-2ps, CF, sec alarm, refrig, W/D, A/C, \$625 + dep. Jerry, x38173 or 480-8220.

Rent: Arkansas cottage overlooking Blue Mt Lake, furn, \$250/wkly or \$50/dly. x33005 or 334-7531.

Rent: Galveston condo, furn, sleeps 6, wknd/wkly/dly rates. Magdi Yassa, 333-4760 or 486-0788.

Lease: CLC, 2-2-2 condo, W/D conn, FPL, CF, split fr plan, A/C, carpet, blinds, \$525/mo. 480-8855.

Sale: Baywind II condo, 1 BR, W/D conn, 1st flr, FPL, appliances, \$28,950. Charlie, 488-8102.

Rent: 3 horse stalls, part board, LC, Kemah area, a.m. feeding & turn-out, pasture. Janice, x39166 or 334-5640.

Lease: House, 3-1-1, 20 minutes from JSC, \$450/mo. Minh, x37492 or 484-2456.

Sale: Cemetery lots at Rosewood Memorial Cemetery, \$395/ea. x40250 or 941-3262.

Sale: Country Briar, 3-2-2, 1440 sq ft, new A/C and roof, whirlpool, \$77.9k or \$76.9k w/o reator. Bill G, x47517 or 487-7059.

Lease: CL area condo, 2-1, W/D conn, pool, storage area, ex cond, no pets, \$475/mo. 486-2048.

Sale: South Shore Harbour, 4-2-2-D, 2 story, lg lot, lg deck, landscaped, \$124k. 334-4240.

Sale: Meadowbend, LC, 2 story, 3-2-5-2, 2200 sq ft, FPL, deck, new A/C, ceiling fans, \$85.9k. x31891.

Sale/Lease: University Trace condo, 2-2, FPL, W/D, refrig, covered parking, \$565/mo. 488-5092.

Sale: Mobile home, '83 Redman, 14 x 70, 2-2, CA/H, vinyl siding, skirting, 2 sets concrete steps, ex cond, to be moved. Linda, 283-0311 or 409-925-4862.

## Cars & Trucks

'90 Pontiac Grand Am, 40k mi, 2 dr, black, tinted windows, A/C, \$4.8k. Brian, 286-2011.

'85 Cadillac Coupe de Ville, 64k mi, garaged, service records, \$5k. Frank, x39924 or 992-3515.

'87 Shelby Charger, 2-2 L Turbo, 5 spd, 47k mi, \$3k. 333-6691.

'81 Chevy Caprice Classic, 4 dr, PS, A/C, good tires, rebuilt eng/trans, 125k mi, \$1.2k. x35385.

'77 Ford Granada, 4 spd, good cond, \$1k. 996-0170.

'84 Honda Civic, 5 drs, auto, A/C, new brakes, AM/FM stereo, \$950 OBO. Jan, 282-3411 or 280-9086.

'93 Corvette Coupe, blk, 7k mi, warranty, pwr, 2 tops, very clean, maint records, \$27k. x34723 or 326-4968.

'84 Nissan 300ZX Turbo, 2 seater, 75k mi, leather, digital dash, very clean, records, \$4.5. x34723 or 326-4968.

'80 Datsun 210, runs good, \$600 firm. x39337.

'87 Ford F150 super cab PU, new paint/tires. 61k mi, Gem top, 6 cyl, 4 spd, PS/PB, ex cond, \$6,950. Roy, x38084 or 482-6985.

'91 Taurus SHO, 43k mi, new tires, alarm, warranty, ex cond, \$11,950. Roy, x38084 or 482-6985.

'83 Ford Ranger, work truck, x35923 or 334-7542.

'91 1/2 ton Ford ext body van, 24k mi, off white, 4 capt chairs, 15-gal fresh water tank, commode & holding tank, 7" b&w TV, \$13k. Calvin or Louise, 339-2181.

'92 Plymouth Grand Voyager LE, quad capt chairs, dual A/C, loaded, low miles, \$15.9k. 532-1673.

'68 restored VW convertible, red, \$2.5k firm. x39337.

'85 GMC Safari SLE 8 pass Minivan, good cond, \$4,950. Norman, 282-3117 or 480-2667.

'88 Chevy 5-10 ext'd cab 4x4, auto, PS/PB, A/C, rebuilt eng, ex cond, \$7.8 OBO. x46289 or 337-1849.

'84 Nissan 200 SX, 2 dr hatch, ex cond, 5 spd, new tires/tires/rods/ball joints/brakes, pwr pkg, \$2.5k. 437-0416.

'78 Ford PU, runs great, auto, A/C, 6 cyl, needs paint, \$1.5k. x31040.

'82 Toyota Cressida, loaded, new paint, ex cond, \$3k. David, x45136 or 488-5888.

'83 Nissan Sentra, good cond, new tires/struts/battery, \$2k. David, x45136 or 488-5888.

'88 Toyota 4 Runner, red, 4WD, 2 dr, V6, auto, A/C,

pwr, cruise, ex cond, \$11k. Jeff, x38424 or 992-9571.

## Boats & Planes

Sailboat, Lido-14, sloop complete w/sails & trailer, \$2.9k. R. Hoover, x31360 or 996-7716.

'86 Hobie Cat 18' sailboat, w/ht hulls, rainbow sails, blue tramp, dbl trap, galv trlr w/custom box, \$1.3k. Rob, x39323 or 286-1719.

Grumman 17' alum canoe, ex cond, w/paddles/icatop carrier, \$275 OBO. Steve, x37152 or 992-7049.

'81 Catalina 25, 7.5 Evinrude, O/B, pop-top, bimini, head, ex cond, bottom job 6-1-94, \$9k. 334-6615.

Glastron 15.5' walk-thru windshield, 60 hp, Johnson O/B, w/trlr, new floor, runs good, \$1.2k. George, x35962 or 996-7583.

Propeller 16" dia, stainless steel, ex cond, \$160. George, x35962 or 996-7583.

'81 Hobie Cat 16', EC, mesh trampoline, dbl trap, white hulls, blue sails/sailbox, galv trlr, \$1.1k. 996-5739.

'82 Chapparral, 18', Mercruiser I/O, SS prop, garage kept, ex cond, \$4,695. x37954 or 481-1605.

'19 Flying Scot sailboat, 20 yrs old, ex cond, new sails & cover, \$4k. x31890.

Water skis, Cypress Garden Pro combo, \$50; Taper-flex wide tunnel wood & fiberglass slalom, 66", \$100. Mark, x38013 or 992-4132.

## Cycles

'82 Honda Sabre, ex cond, custom built w/may extras, \$1.9k. Johnny, 470-0820 or pager 618-1689.

10 speed, CLIC-Centurion, 27", black, everything works, original owner, \$50. James, 333-7174.

'93 Kawasaki EX 500, ex cond, 1.1k mi, matching helmet included, \$3.8k. 282-3278 or 538-1495.

Folding bicycle, great for boat or camper, \$100 firm. 333-2917.

Man's Nishiki sport model, 12 spd, 19", ex cond, \$95 OBO; woman's Nishiki sport model, 12 spd, 19", ex cond, \$115 OBO. 488-4741.

Raleigh & Fuji 10 spd, \$100/ea. Susan, x35724 or 538-4034.

## Audiovisual & Computers

Commodore 64, extra kybd & drive, modem, games & ed software, \$100 OBO. Sandy, x33315 or 334-7542.

Uniden RD9XL, X&K band radar detector, OBO. Jim, x45068.

Personal computer, 286 w/Windows and games, color printer, mouse, joystick, \$395/all. 286-5971.

Sega 16 BIT w/8 games, \$225; Nintendo w/9 games, \$175. Shelly, 282-3168 or 488-6017.

Amdek model Color-1 Plus 14" color monitor compatible w/Apple II series or similar, \$40; 17 games for Apple IIe computer, \$3 ea; new Apple hand controllers, \$15; Apple IIe computer, no peripherals, ex cond, \$95. 280-9621.

PC parts, Fujitsu HD 540 MB SCSI, \$250; MultiTech 14.4 fax modem, v.32 bis, portable, \$75; 3.5 FD, \$30. Kevin, 480-0014 ext 43.

Kenwood KR720, 40 watt recvr, JVC 10-band equalizer, Harmon Karden cassette deck Technics turntable, \$150/all. Nelson, x38486 or 332-0746.

IBM compatible Kaypro computer, two 5.25" drives, 768 k RAM, printer & Thomson color monitor included, \$400. 333-2917.

80 MB, MFM, 28 ms, FH HD w/card/cables, dbl spaced w/110 MB of software, \$100 OBO. x34701.

286 DTK computer, 1 MB RAM, 40 MB HD, 5.25" floppy, amber monitor, Hercules graphics, kybd, \$250. 996-5739.

Hard disc drive, Conner F5400A, 540 MB, 12 ms, IDE, new, \$329. x37954.

286-12MHz IBM compatible computer, Packard Bell EGA color monitor, 11 function ext kybd, 3-

button mouse, 5.25" drive, 30 MB HD, s/w, games, \$250; Epson IBM compatible w/color monitor, 10 function kybd, two 5.25" drives, Epson LX-800 NLQ printer w/stand, s/w, manuals, \$225. x34058.

Active color notebook, 386 SL-25, 4 MB RAM, 210 MB removable HD, 1.44 MB floppy, 2 PCMCIA type II or I type III slots, DOS, Windows, \$1,650 OBO. Kelley, x36818 or 488-8194.

Utah speakers, 10" woofer, 3 way, ex cond, \$50/pr. Mark, x38013 or 992-4132.

## Photography

View camera, 4x5" Calumet, rail type in ex cond, w/lenses, 6 film holders, carry case, 3 lenses, good cond, \$550 OBO. Steve, x37152 or 992-7049.

## Musical Instruments

King coronet, ex cond, \$350 OBO. 488-4741.

Fender Telecaster, professional model made in USA to 1952 specs, blonde w/black pick guard, Fender amp & hardshell case, \$750. x35180 or 326-3706.

Yamaha, 6-piece maplewood custom drumset w/ Zildjian symbols, \$1,650; Remo Rotor Toms, \$95. x35180 or 326-3706.

Bundy trumpet, beginners model, well cared for, \$100. Mark, x30909 or 487-4249.

## Pets & Livestock

Doberman pups, pure bred, tail docked, wormed, colors red, blue, fawn, black/tan, \$50/ea. Pat, x45384 or 409-925-6405.

Birds for sale, Congo African Greys & Amazons; Mexican red-head. Pat, x45384 or 409-925-6405.

Boxer pups, born 6-28; black boxer mix female, 1yr old, shols, x35590 or 991-0821.

Healer/shellie mix, male, 5 yrs old, not good w/children or other pets, \$20. x31890.

Seven Chow pups, black, cream red, \$85/ea. F. Ali, 563-2391.

## Household

Couch & loveseat, beige w/gold stripe, good cond, \$125; qn sz hide-a-bed, \$250. Ray, x35954 or 487-4889.

Black lacquer coffee table & 2 end tables, good cond, \$125 OBO. Tom, x36309 or 474-9747.

Kenmore freezer, 12.6 cu ft frost free, upright, good cond, \$100. 480-6771.

Tapcon solid state electric range, like new, ex cond, \$250 OBO. Jean, x32215 or 922-6674.

Roll top desk, full sz, good cond, \$75 OBO or trade for baby crib. Nelson, x38486 or 332-0746.

Early American LR set, sofa, chair & ottoman, coffee tbl & end tbl, rust-autumn leaves, \$400 OBO. x35752.

Queen Anne, solid cherrywood table, 4 chairs, 2 king chairs, table covers included, \$500. x35751 or 332-2092.

Black TV stand for 35" TV, about 1' high w/glass doors, \$120 OBO. Laurie, x35590 or 991-0821.

On/full sz hdbd, pecan/walnut, triple dresser w/dbl mirrors, \$350; Tunturi rowing machine, \$45; RCA 52" big screen TV, color w/remote, \$600. 482-8820.

Couch & loveseat, navy velour, \$200; solid maple twin hdbd/ttd/rails, \$35. x33315.

Broyhill DR set & matching hutch med cherry, \$600; kg sz motionless waterbed, w/attached night stds, \$150; Qn Victorian brocade couch, 2 match good chrs, \$

# Light Flight

## Experiments get a lift

By Kent Joosten

To her crew, she's the "Weightless Wonder," to her passengers, she's the "Vomit Comet." But regardless of the name, this unusual aircraft helped the Planetary Projects Office take another step closer to renewed human exploration of the moon.

The "Comet" is a specially modified Boeing KC-135A turbojet transport, designation NASA 930, operated by JSC's Reduced Gravity Office.

By flying a series of "roller-coaster" parabolic maneuvers, short periods of reduced gravity are experienced onboard. While most flights are dedicated to zero-g astronaut training and equipment tests, two missions were flown in February simulating the one-sixth gravity environment of the lunar surface.

The goal of the Planetary Missions and Materials Office was to identify small teams of investigators who had expertise relevant to future lunar exploration and experiments that were ready to fly aboard the KC-135, but that might not otherwise have had access to this unique facility. In exchange for the flight opportunities, these teams provided all the test

equipment, personnel and data analysis, along with a final report to NASA.

The principal flight payload consisted of experiments aimed at furthering the understanding of industrial-scale lunar resource extraction processes. Learning how to extract and use space resources is potentially one of the highest payoff technologies for human exploration beyond low Earth orbit.

The more we learn to "live off the land," the less material will have to be transported from Earth, and the less costly future missions will be. In the case of the moon, there are vast reserves of oxygen locked up in the lunar soil. In fact, nearly half the weight of the lunar surface material is oxygen.

Oxygen produced on the moon could be used for many purposes — breathing gas, water production, power generation, and spacecraft propellant oxidizer for the return to Earth. All of these applications hold promise for reducing exploration mission costs.

"Fluidization" — the rapid efficient mixing of fine-grained solids with reacting gas — is one of the most promising candidate processes for extracting oxygen from lunar soil. A

team from Carbotek Development Laboratories and Japan's Shimizu Corp. constructed a "fluidized-bed" reactor to investigate the interactions of solids and gases in a lunar gravity environment.

In an operational production plant, hydrogen gas would be bubbled up through a reaction chamber containing heated lunar soil to break the chemical bonds and release oxygen. Terrestrial fluidized bed applications include synthetic fuel production and steel making, and the reaction mechanics in one-g are well understood. The rules change drastically in a lunar gravity field however, and the test apparatus' Plexiglas reactor and standpipe allowed investigators to observe the flow behavior of simulated lunar soil during the 30-second periods of one-sixth gravity flight.

A second, related experiment flown by Carbotek is part of a NASA-sponsored investigation into another potential lunar resource extraction technique — magma electrolysis. In this process, lunar material would be heated beyond its melting point, around 1500 degrees centigrade, and oxygen would be produced by electrolyzing the molten feedstock. Because it will be difficult to observe

the oxygen bubbles and their circulation characteristics in a reactor filled with magma, a Plexiglas model was constructed using clear silicone oil to simulate the highly viscous molten rock and steel tubes delivering nitrogen gas to simulate oxygen forming at an anode. During the one-sixth gravity periods, the bubbles were videotaped for later analysis to determine bubble size, rise, velocity and disengagement time.

Not all activity on board the KC-135 had to do with equipment and chemical processing — other passengers were more interested in human responses to the one-sixth gravity environment. Griffin Design of Huntsville, Ala. was eager to investigate the implications of reduced gravity on an engineering model of their spacesuit concept called the Command and Control Pressure Suit.

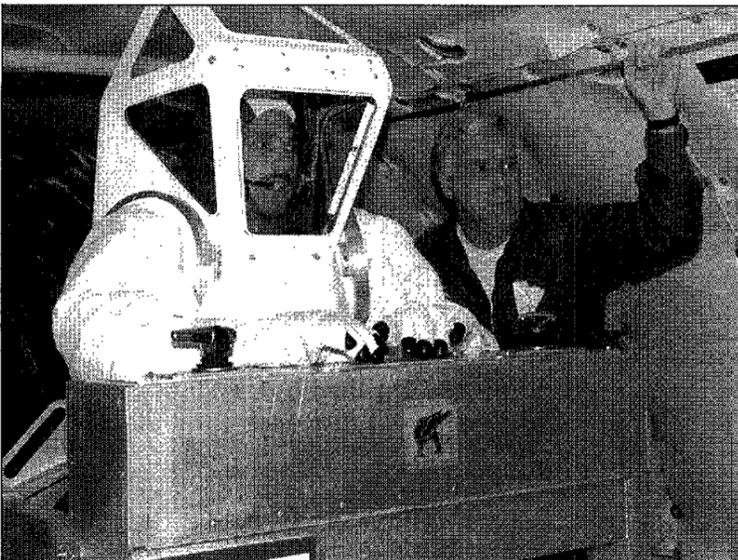
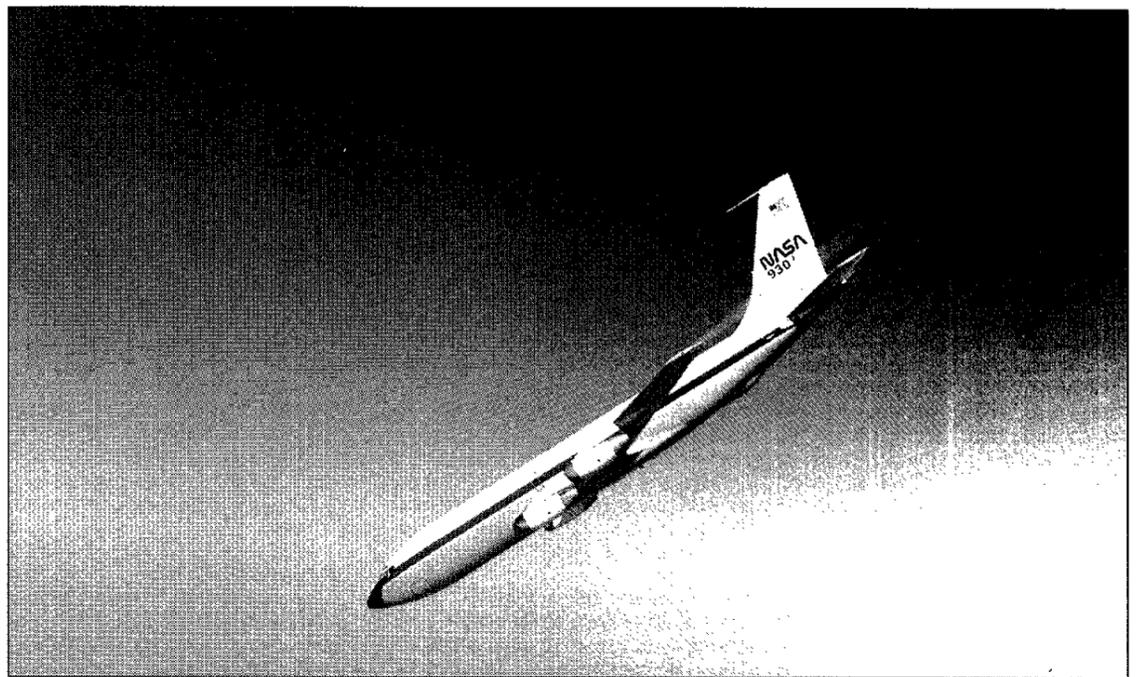
Designed specifically for lunar construction and exploration, the suit features a combined helmet-upper torso assembly allowing it to become, in effect, a "cockpit" for lunar rovers or other equipment. A mechanical and data interface at the mid-torso would structurally connect the suited astronaut to these vehicles and allow commands to be issued to vehicle

systems. The suit also has a rear-entry feature to reduce the number of seals which must be protected against lunar dust. During the lunar gravity flight regimes, test subjects evaluated the ease of donning and doffing the suit, engaging and disengaging the mechanical interface, positioning feet in restraints, and general mobility.

Finally, JSC's Flight Crew Support Division prepared a series of "human factors" tests involving lifting and fine motor tasks. Participants stowed and unstowed heavy objects at different heights to evaluate the need or usefulness of foot restraints in one-sixth gravity, bolted and unbolted equipment as rapidly as possible at different angles, and tested their bench press and arm lift capabilities on an exercise dynamometer. The results of these tests will aid in the design of lunar base workstations and equipment maintenance aids.

So what is it like to work in lunar gravity? Well, one-finger pushups, catching spilled liquids before they hit the floor, and doing a triple axle without really trying are possible.

Perhaps the first large structure built on the moon should be the Lunar Olympic Stadium. □



Clockwise from top right: JSC's KC-135 aircraft dives toward the ground as part of the parabolic maneuvers that induce a reduced gravity environment.

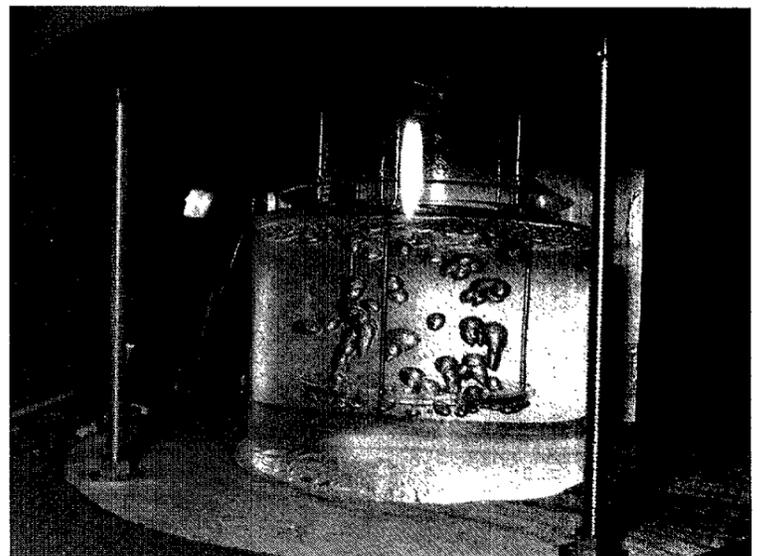
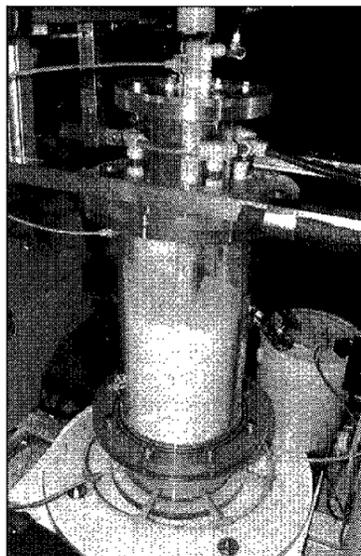
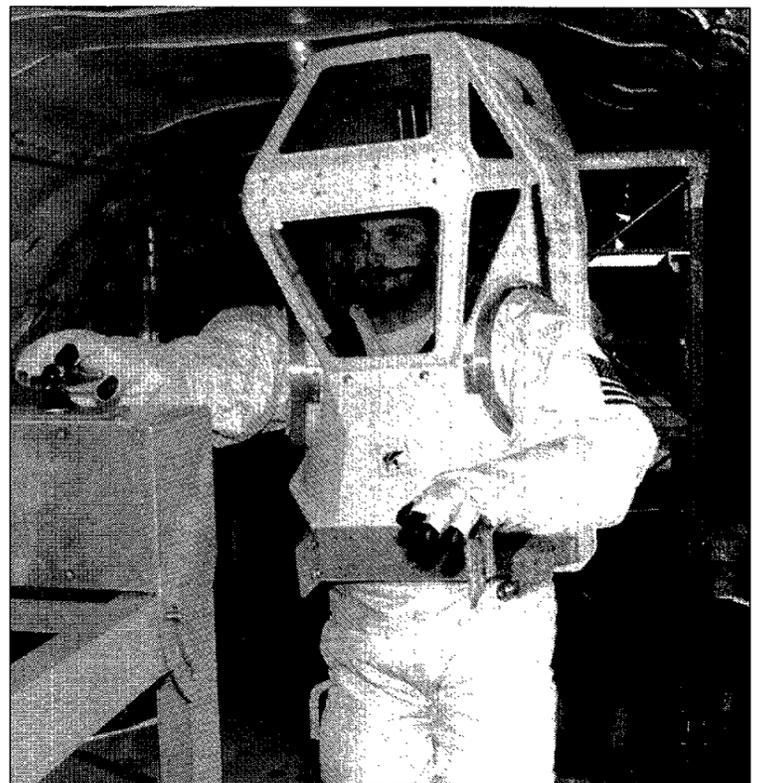
Stuart Lee of Krug demonstrates the Command and Control Pressure Suit on board the KC-135. The suit consists of a hard upper torso and helmet combination. Lee was evaluating the mobility of the suit and the range of vision allowed by the helmet.

On board the KC-135, this investigation into magma electrolysis as a method for extracting oxygen from the lunar surface used clear silicone oil to simulate highly viscous molten rock and steel tubes delivering nitrogen gas to simulate oxygen.

Industrial micro beads used in the fluidized bed reactor simulate lunar surface dust.

Terry Fleming of Lockheed attempts a bench press exercise during one of the aircraft's parabolic runs.

Lee tests the dexterity of the Command and Control Pressure Suit gloves assisted by John Connolly.



# KSC employees caught in coup at African shuttle landing site

By Susan Walsh  
KSC Spaceport News

While thousands of Kennedy Space Center employees were planning their weekend activities on the way to work on the morning of July 22, a small contingent of KSC workers found themselves in the midst of a military coup d'etat halfway around the world.

Four lieutenants of the Gambian National Army seized power that day in a bloodless coup in The Gambia, a small African nation whose major airport serves as one of four NASA Transoceanic Abort Landing sites for the space shuttle.

"It was not a pleasant situation," recalled NASA operations manager and group leader Thomas Howard. "But if we had to be stuck there, we had the right personnel to make the best of a bad situation."

The members of the NASA team had little time to dwell on anxieties about their personal safety as they volunteered

their services in the U.S. Embassy and ambassador's residence there, or at hotel in the capital, Banjul, where nervous American and European tourists had lost communication with the outside world. They were part of the 30-member TAL site team that had arrived in Banjul on June 29 to support STS-65.

The Armed Forces Provisional Ruling Council ousted the government that had ruled the country for 30 years, suspended the constitution, banned political parties, instituted a 7 p.m. to 7 a.m. curfew, and ordered all airports, seaports and land borders closed. They also cut phone lines.

It was the latter move that concerned EG&G security employee Ronald Simons the most. "Our major worry was what our families were thinking and how they would react."

Simons and Howard looked down gun barrels held by soldiers when they attempted to reach Banjul International Airport where they were scheduled to

meet with officials about NASA agreements. The rest of the team was at a Banjul hotel preparing for a flight back to America. Simons and Howard, in a NASA-owned truck, came to a roadblock where guards armed with AK-47 automatic rifles pulled them over and asked them to get out. "One guard demanded the key so we gave it to him," Simons explained. "I asked if we could take our personal items. He was kind of hesitant, but we grabbed our briefcases and the computer I had brought."

The two were left on the road in the hot sun to make their way back to the hotel, more than 15 miles away. They soon discovered that all phone lines were dead, so they hired a local to drive them back.

They didn't make it back to the hotel — or to their clean clothes — for the rest of the weekend. They reported to the U.S. Embassy instead, where they were enlisted to help restore communications and assist Americans. They worked long

hours, snatching a few hours of sleep at a "safe haven" house across the road from the embassy. Simons worked one 36-hour stretch without sleep.

Back at the Kairaba Beach Hotel, Jim Moos, head of the Lockheed Space Operations Co. group working at the TAL site, became the "warden officer" responsible for overseeing Americans at two hotels and serving as their communications link. He set up an around-the-clock command post, and the TAL site workers took two-hour shifts manning a radio that provided their only link to the world. The tensest moments came Friday night, when soldiers twice entered the hotel, once to demand food at gunpoint. Among those who helped operate the radio were KSC Lockheed employees Donald Russo, William Gordon, Pat Phillibert and Michael Wilson. William Rogers, a Lockheed communications technician, repaired a radio which served as a vital communications link to the embassy.

As the only physician in the area, Dr. Steven Taubkin of EG&G Florida Inc., went to the ambassador's residence and saw patients ranging from a pregnant woman to a Peace Corps volunteer with mononucleosis.

Back at KSC, apprehension mounted for managers struggling to determine the whereabouts and safety of employees after being notified by JSC, which had been called by the State Department.

"We try to prepare NASA and Department of Defense off-site personnel for the unexpected at our pre-deployment briefings," agreed Deshotel, who is NASA's Contingency Landing Site security manager. "Everyone in this case did the right thing."

"That's one thing about Americans, and this group in particular," remarked Simons. "When something happens, they come together to work as a team. That was what was so neat about this. No one hesitated to give their time and do what needed to be done."

## Last group of astronaut hopefuls here

The last of six groups of prospective astronauts were at JSC this week for orientation, interviews and medical evaluations.

Of 2,962 applicants, 122 are being interviewed for a chance to be among approximately 20 named as astronaut candidates. The final selections will be announced in the fall with the new astronaut class reporting in early 1995. Those selected will join an international astronaut candidate representing Japan.

The sixth group of 22 includes Charles Buntin, JSC; Victoria Coverstone-Carroll, Urbana, IL; Marcela Gomez, Cary, NC; Jeanine Hoffman, Torrance, CA; Maynard Holliday, Hayward, CA; Rick Husband (Major, USAF), stationed in Amesbury Wilts, United Kingdom; Sean Kelly, JSC; Joseph Lanni (Major, USAF), Las Vegas, NV; Marvin LeBlanc, JSC; Alma Levy, Redondo Beach, CA; Rodney Lofton, JSC; Richard Mastracchio, JSC; William McCool (Lt. Cdr., USN), Anacortes, WA; Cheryl McPhillips, Merritt Island, FL; Gregory Ojakangas, Duluth, MN; Stephen Robinson, Cambridge, MA; Joseph Rodgers (Major, USMC), stationed in Darwin, Australia; Stephen Ruffin, Decatur, GA; Scott Sawyer, San Jose, CA; Ernest Simo, Richardson, TX; Bernard Soriano, Bridgewater, NJ; and Charles Sternberg (Lieutenant, USN), Middletown, RI.

## Workshops focus on positive change

(Continued from Page 1)

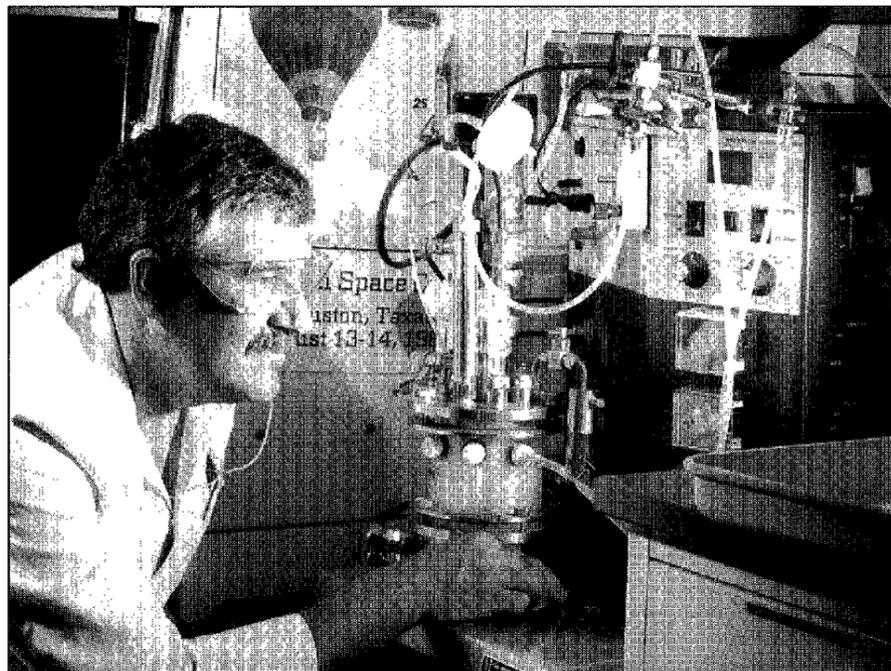
out the best in their employees.

Jacqueline Reid, president of an international training company, will present Wednesday's workshops. She has trained more than 15,000 people in management-related topics for clients such as the Department of State, the Department of Defense and the U.S. Air Force.

Wednesday's schedule begins at 8:15 a.m. with "Managing Negativity in the Workplace." Negativity is a by-product of change and is the path of least resistance for many. The workshop will teach employees techniques to protect themselves from negativity and develop positive attitudes for productive performance.

At 1 p.m., Wednesday's schedule continues with "Crisis of Middle Managers," a look at the impact of organizational change on those in middle management who are sandwiched between the expectations of upper management and the resistance of those for whom they are responsible. The course is targeted for current and potential managers, and will teach skills for effectively facilitating change and diagnosing system problems.

Although sponsored by the FWP, the workshops are intended for both men and women. Civil servants will receive training credit from JSC's Human Resources Development Branch. For more information, contact Adams at x33761.



Dave Koenig works with a device designed to track how bacterial films form on water line materials in his Bldg. 37 laboratory.

JSC Photo by Robert Markowitz

## JSC balloonists float on the wind

(Continued from Page 1)

marily an early morning sport because weather conditions are the most stable then and in the evening. It takes about 15 minutes to unload his 90,000-cubic-foot balloon from its trailer and inflate it. An average ride lasts about an hour. The direction traveled depends on wind currents. Pilots navigate by raising and lowering the balloon's altitude to take advantage of the currents.

Koenig's primary crew member is wife, Tracey, but he enjoys training new crew members who usually end up buying their own balloons after catching the fever exactly as he did crewing for a friend while at the University of Mississippi.

Barnes began ballooning while a cemetery clerk for the City of Decatur, Ala. She started crewing for the city park department's balloonist. She quickly

known as the "Decatur gator," notorious for her water landings.

She always flies with her dog, Rally, a schipperke named after the brand of balloon she flies. She has ballooned in the U.S., France and Japan, and is a designated balloon pilot examiner in Alabama, trying to transfer that title to Houston.



Barnes

Her crew chief is 8-year-old son John, who has been flying since before he was born. Her husband, Toby, is a pilot, but she'd rather worked as her ground chase crew. Barnes and Koenig, who is president of the Dickinson Independent Balloon Society he founded, have been ballooning together for years even though she only moved here in June. Koenig once helped rescue her by using his hatchet to help extricate it from a tree after it "landed kind of in a tree" and deflated.

## Economic, political changes lead to reduction in orbital debris

(Continued from Page 1)

affected the orbital debris environment, according to Levin.

The end of the Cold War saw a dramatic reduction in Russia's military space program and a reduction in the testing of anti-satellite weapons by both the United States and Russia. That testing is believed to have contributed to the debris popu-

lation during the early to mid-'80s.

A third reason for the improvement also can be attributed to economic and political changes. The worldwide launch rate has fallen almost 40 percent in the last nine years.

According to Levin, natural forces play a large role in the debris environment in low-Earth orbit. Objects in orbits from 250-400 miles are affect-

ed by changes in the solar cycle. During the peak of the cycle, the density of the atmosphere increases at these altitudes, slowing the debris and causing it to re-enter the atmosphere. Much of the debris in the proposed space station orbit reentered during the unusually strong peak associated with the last solar cycle.

Of increasing concern to NASA is

the orbital debris population at higher altitudes — from 500-650 miles. Debris in these orbits exceeded predictions. The long orbital life at these high altitudes means that debris in these orbits will not pose a hazard to the orbiting space station. However, these orbits are important for scientific, Earth observation, weather and communications satellites.

## STS-64 to deploy free-flying Spartan 201

(Continued from Page 1)

late this month for a review all STS-64 mission preparations, following which an official launch date will be announced.

STS-64 will carry the Lidar In Space Technology Experiment and the Shuttle Pointed Autonomous Research Tool for Astronomy 201 as its primary cargoes. LITE will study the cloud tops and atmosphere using a laser radar while Spartan 201 will fly free from *Discovery* for about two days to research the solar wind. Other experiments on STS-64

include the Robotic Operated Materials Processing System, a crystal growth experiment that uses an autonomous robot to process samples; the Shuttle Plume Impingement Flight Experiment, a test that will characterize disturbances caused by the exhaust from the shuttle's steering jets; the Simplified Aid For EVA Rescue, a small spacewalker's maneuvering backpack designed to be used for self-rescue; and several Get Away Special canisters.

Other work on *Discovery* this week included standard leak checks, valve

tests and electrical tests of the main propulsion system, preparations to load the hypergolic propellants and an auxiliary power unit test.

Elsewhere, the Atmospheric Laboratory for Applications and Sciences was installed in Atlantis this week in preparation for its third trip to orbit. *Atlantis* is in the Bay 3 processing hangar. In the VAB, the solid rockets for STS-66 are being stacked.

In Bay 1, *Columbia* is being readied for a trip to Rockwell's Palmdale, Calif., shuttle factor for standard inspections and modifications.

## Courses to foster partnerships for growth, learning

By Jovan-Justine Love

The JSC chapter of the National Management Association is offering a series of professional development courses beginning Tuesday.

The goal of the courses is to establish partnerships for growth and learning between JSC senior management, employees, contractors and local NMA chapters. The series will provide continuing professional education to both members and non-members.

The courses are free to JSC civil service employees and at minimal cost to contractors. All classes meet in Bldg. 4 South, Rm. 1717.

The courses begin with "Challenging People to Succeed." This course is designed to help identify and maintain successful performance behavior for participants and others. Participants will learn how to combat low morale and enhance productivity and creative problem solving. "Challenging People to Succeed" will be offered from 5-7 p.m. Tuesdays, Sept. 6 through Nov. 8. The course will be taught by Jovan-Justine Love.

A lecture series on "Leadership Development" will be lead by Debbie Conder. Several JSC senior managers including John O'Neill, Dave Leestma, Estella Gillette and Mike Christensen will participate in lectures. "Leadership Development" be taught from 5-7 p.m. Wednesdays from Sept. 7 through Oct. 19.

Ralph Schomberg will teach the course on "Business Concepts" focusing on fundamental concepts to increase efficiency on the job. Participants will learn the basic skills necessary to meet the challenges of new business practices. "Business Concepts" will meet from 5-7 p.m. Mondays from Sept. 12 through Oct. 24.

Courses planned for Spring 1995 include "Law for the Layman," "Leadership for a new Era," and "Developing Employee Performance." To register or for additional information, contact Jovan-Justine Love, x39319. For information on courses offered through the Rockwell NMA chapter, contact Sally Jurgens, 282-3180.

## Spacecraft Design revisits reunion

Plans are in the works for a second reunion party for members of the abolished Spacecraft Design Division.

The reunion will start at 4:30 p.m. Oct. 14 at the south Gilruth Center pavilion. Cost is \$7. Participants are encouraged to bring old pictures. For reservations, contact Sharon at x38960, Lori at x36600, Flo at x33738 or Ann at x36619 by Oct. 7.

## Space News Roundup

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